

CLAIMS

- 1 1. A method of correcting resonance position or the external decay time of a
- 2 waveguide micro-resonator comprising physically altering by deposition, removal, or growth
- 3 of material in or around said waveguide.

- 1 2. The method of claim 1, wherein said altering of the material occurs on the core of
- 2 the waveguide micro-resonator.

- 1 3. The method of claim 1, wherein said altering of the material occurs in the cladding
- 2 of the waveguide micro-resonator.

- 1 4. The method of claim 1, wherein reaction products of a deposition or growth have
- 2 different chemical compositions from that of the core.

- 1 5. The method of claim 1, wherein said altering comprises a wet chemical reaction.

- 1 6. The method of claim 1, wherein said altering comprises a thermal reaction at
- 2 temperatures above 100°C.

- 1 7. The method of claim 1, wherein reaction products of a growth are removed after the
- 2 reaction associated with said growth.

- 1 8. The method of claim 1, wherein reaction products of a growth are left between the
- 2 core and the cladding after the reaction associated with said growth.

- 1 9. The method of claim 1, wherein reaction products of a deposition or growth have

2 refractive indices that range from that of the core to that of the cladding.

1 10. The method of claim 1, wherein reaction products of a deposition have a graded
2 refractive index profile from that of the core to that of the cladding.

1 11. The method of claim 1, wherein said altering results in a change in optical path
2 length in said waveguide micro-resonator.

1 12. The method of claim 1, wherein said altering results in a change in coupling of
2 said waveguide micro-resonator, thus in a change in coupling efficiency and shape of the
3 waveguide micro-resonator resonance.

1 13. A method of correcting the position of or the shape of resonance of a waveguide
2 micro-resonator comprising focusing a large amount of electromagnetic energy onto the
3 resonator.

1 14. The method of claim 13, wherein said electromagnetic energy transfers a large
2 amount of thermal energy to the cavity core of said waveguide micro-resonator.

1 15. The method of claim 13, wherein one or more materials comprising the waveguide
2 micro-resonator undergoes a physical or mechanical change.

1 16. The method of claim 13, wherein one or more materials comprising the waveguide
2 micro-resonator core undergoes a physical or mechanical change, or an index change.

1 17. The method of claim 16, wherein one or more materials comprising the waveguide

2 micro-resonator core undergoes an index change as a result of photosensitivity.

1 18. The method of claim 16, wherein one or more materials comprising the waveguide
2 micro-resonator core undergoes an index change as a result of a long lasting photo-refractive
3 effect.

1 19. The method of claim 13, wherein said electromagnetic energy transfers a large
2 amount of thermal energy to a region surrounding the waveguide micro-resonator cavity.

1 20. The method of claim 13, wherein one or more materials surrounding the
2 waveguide micro-resonator undergoes a physical change from non-chemical origins.

1 21. The method of claim 13, wherein one or more materials surrounding the
2 waveguide micro-resonator undergoes a mechanical change.

1 22. The method of claim 13, wherein one or more materials surrounding the
2 waveguide micro-resonator undergoes an index change as a result of photosensitivity.

1 23. The method of claim 13, wherein one or materials surrounding the waveguide
2 micro-resonator undergoes an index change as a result of a long lasting photo-refractive effect.

1 24. The method of claim 13, wherein said electromagnetic energy induces a change in
2 optical path length in said waveguide micro-resonator.

1 25. The method of claim 13, wherein said electromagnetic energy induces a change in
2 coupling of said micro-resonator, thus a change in coupling efficiency and shape of the micro-

3 resonator resonance.

1 26. A high index difference waveguide micro-resonator device that temporarily
2 changes position or shape of resonance comprising:

3 at least one patterned layer core, the at least one patterned layer core has at least one
4 resonator and at least one input/output waveguide; a cladding surrounding said core, said
5 cladding including regions surrounding said core where an evanescent field resides unless
6 temporarily changed; and

7 non-intersecting input and output waveguides;

8 at least one layer defining a tuning region; and

9 at least one electrode in poor electrical contact with said core, wherein

10 said position or shape of resonance is temporarily changed by applying a current or
11 voltage to said at least one electrode so as to induce a change in index of refraction in said
12 tuning region.

1 27. The device of claim 26, wherein the tuning region is used to change the index of at
2 least part of the cladding by a thermo-optic effect.

1 28. The device of claim 26, wherein the tuning region comprises a material whose
2 index is changed through an electro-optic effect.

1 29. The device of claim 26, wherein the tuning region comprises a material whose
2 index is changed through an acousto-optic effect.

1 30. The device of claim 26, wherein the tuning region comprises a material whose

2 index is changed through a magneto-optic effect.

1 31. The device of claim 26, wherein the tuning region comprises a material whose
2 index is changed through a photo-refractive effect.

1 32. The device of claim 26, wherein the tuning region comprises a material that is able
2 to move mechanically.

1 33. The device of claim 26, wherein means for generating a change in the cladding of
2 the micro-resonator are monolithically integrated with said input and output waveguides.

1 34. The device of claim 26, wherein means for generating a change in the cladding of
2 the micro-resonator are hybridly integrated with said input and output waveguides.

1 35. The device of claim 26, wherein means for generating a change in the cladding of
2 the micro-resonator are fabricated in the vicinity of said input and output waveguides.

1 36. The device of claim 26, wherein means for generating a change in the cladding of
2 the micro-resonator are placed in contact with a substrate on which the micro-resonator is
3 configured.

1 37. The device of claim 26, wherein said at least one electrode stands off at a distance
2 larger than decay length of the optical intensity in the cladding.

1 38. The device of claim 26, wherein change of said cladding results in a change in
2 optical path length in said micro-resonator.

1 39. The device of claim 26, wherein change of said cladding results in a change in
2 coupling of said micro-resonator, thus a change in coupling efficiency and shape of the micro-
3 resonator resonance.